Anywhere

INTELLIGENT CONNECTIVITY




Intelligent Video Surveillance Solutions

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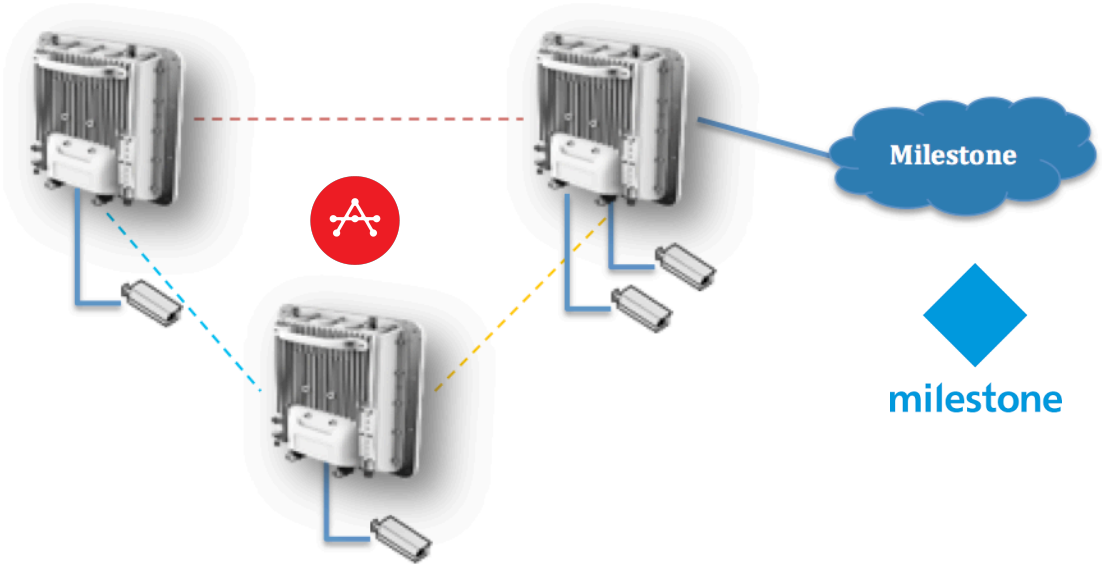
+

milestone

Intelligent Video Surveillance Solution

Intelligent Video Surveillance Solution

Anywhere Network and Milestone together can provide an end-to-end solution for any Smart City/ Safe City digital video surveillance project. Anywhere Networks' intelligent high-speed data network transmits high-quality video streams and Milestone XProtect series software provides backend video recording & video analytics.

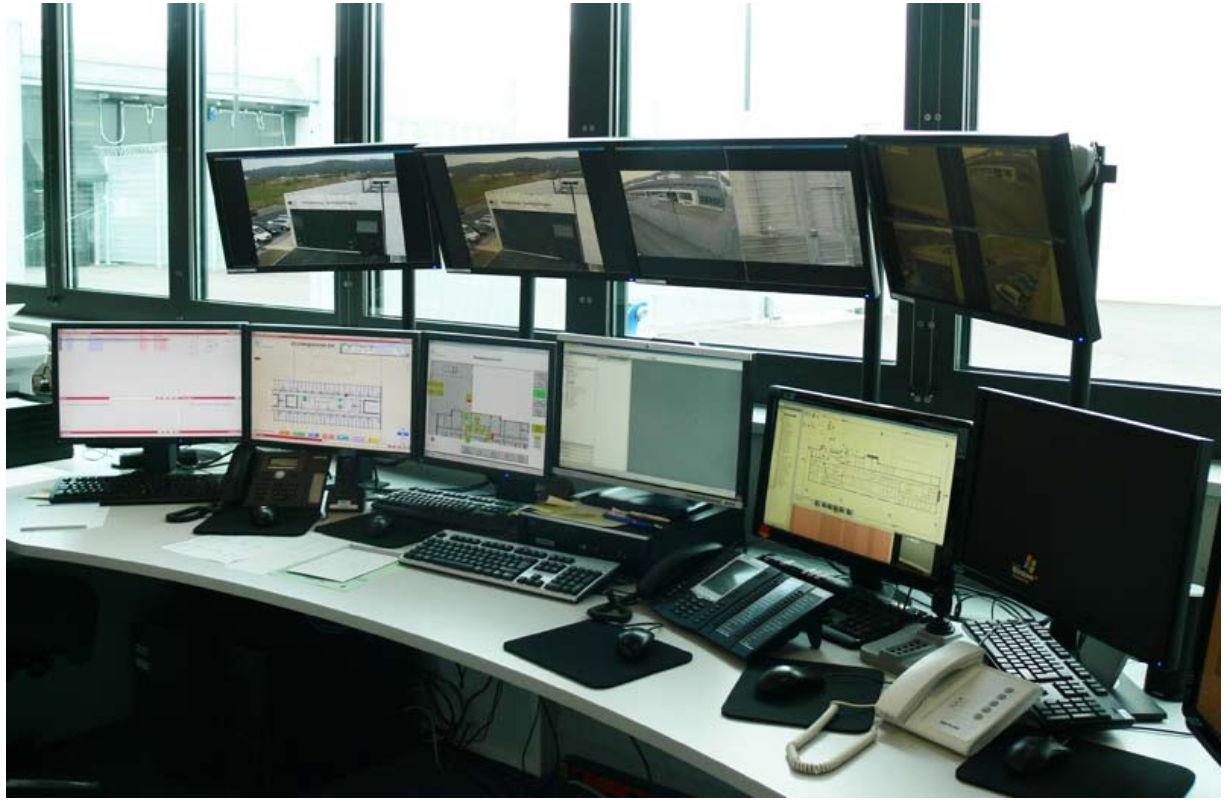


Intelligent Video Surveillance Solution

Our X30 & X20 series of wireless network nodes offer fiber-like transmission quality & can be used to build large scale MESH networks providing highly reliable data connectivity for a district, campus or zone covering extended areas in Smart City/Safe City projects with redundancy & self-healing capability.

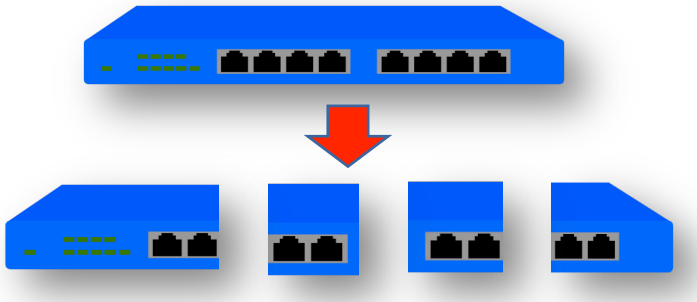
Intelligent Video Surveillance Solution

4K HD video images can be transmitted from each video camera through the Anywhere Network wireless mesh links to the Milestone video recorder for real-time image analytical services. Each wireless link established by the X30 or X20 network nodes can provide up to 600-1000 Mbps data transfer throughput with less than 2% throughput drop for each hop.

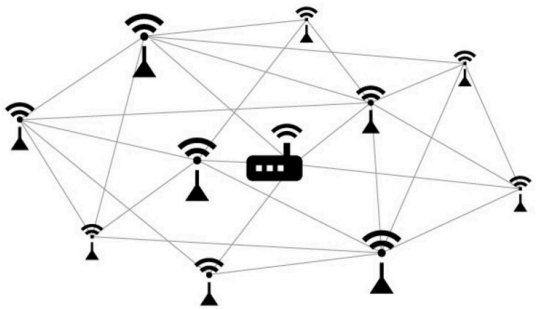


Anywhere Networks Product and Solutions

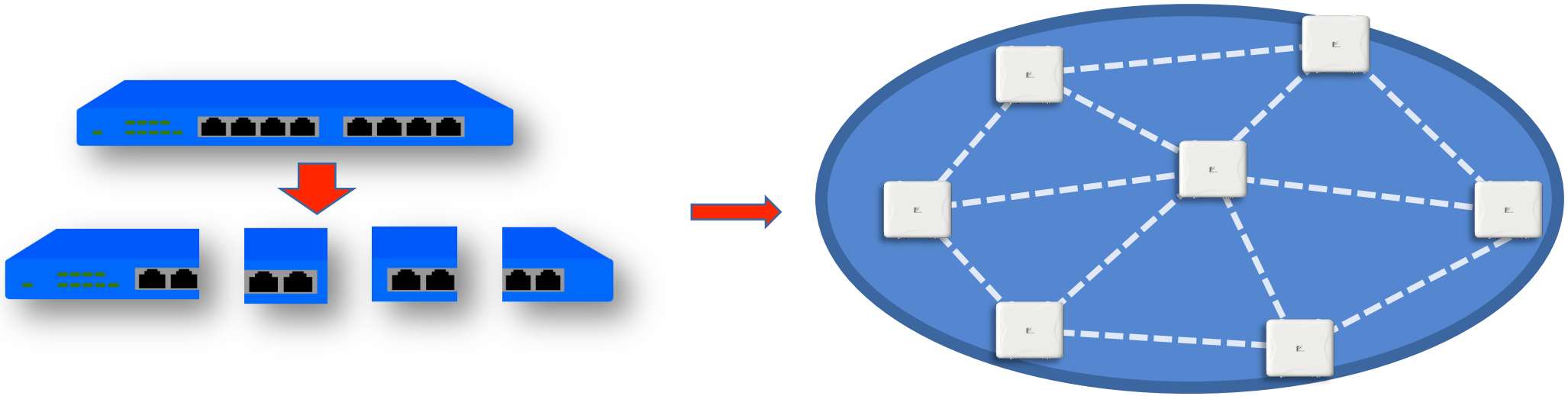
- Ethernet Switch architecture – Full Ethernet standard compliance and complete mobility
- Start with one physical location and seamlessly grow network to thousands of locations
- Highest security with encapsulation technology
- Mesh topology, QoS, load balancing, low latency key to achieve reliable connectivity anywhere
- Intelligent network capability to leverage existing fixed infrastructure
- Wireless to extend reach and provide redundancy



Distributed Ethernet switch, 19,200 network nodes and 300 network offload gateways



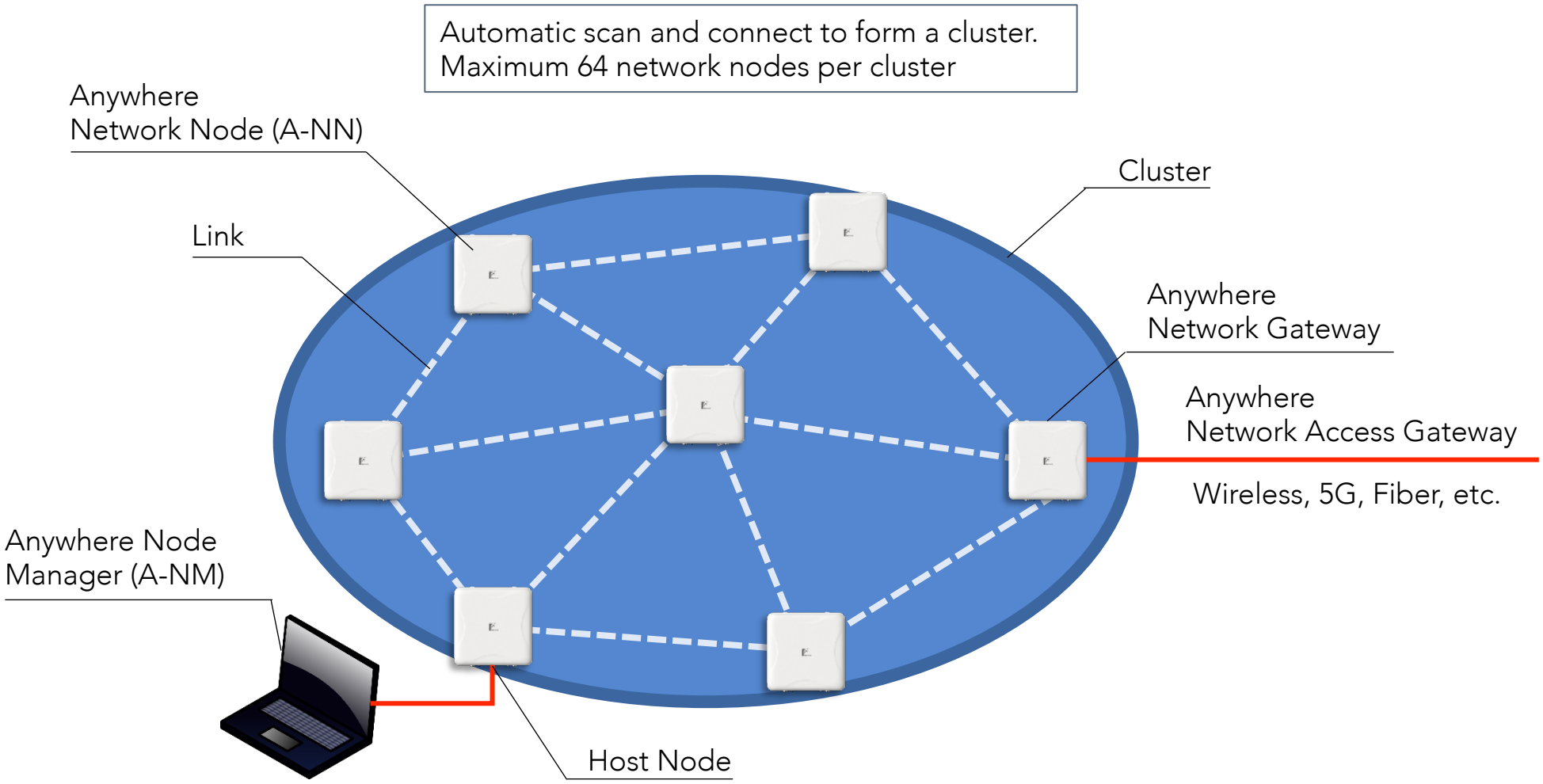
Anywhere Networks Solution



A distributed Ethernet switch with intelligent networking technology

- Place network nodes where Ethernet connectivity is required
- Single IP address for Centralized Management
- One network (one IP address) can manage up to 19,200 network nodes (locations) and 300 network access gateways

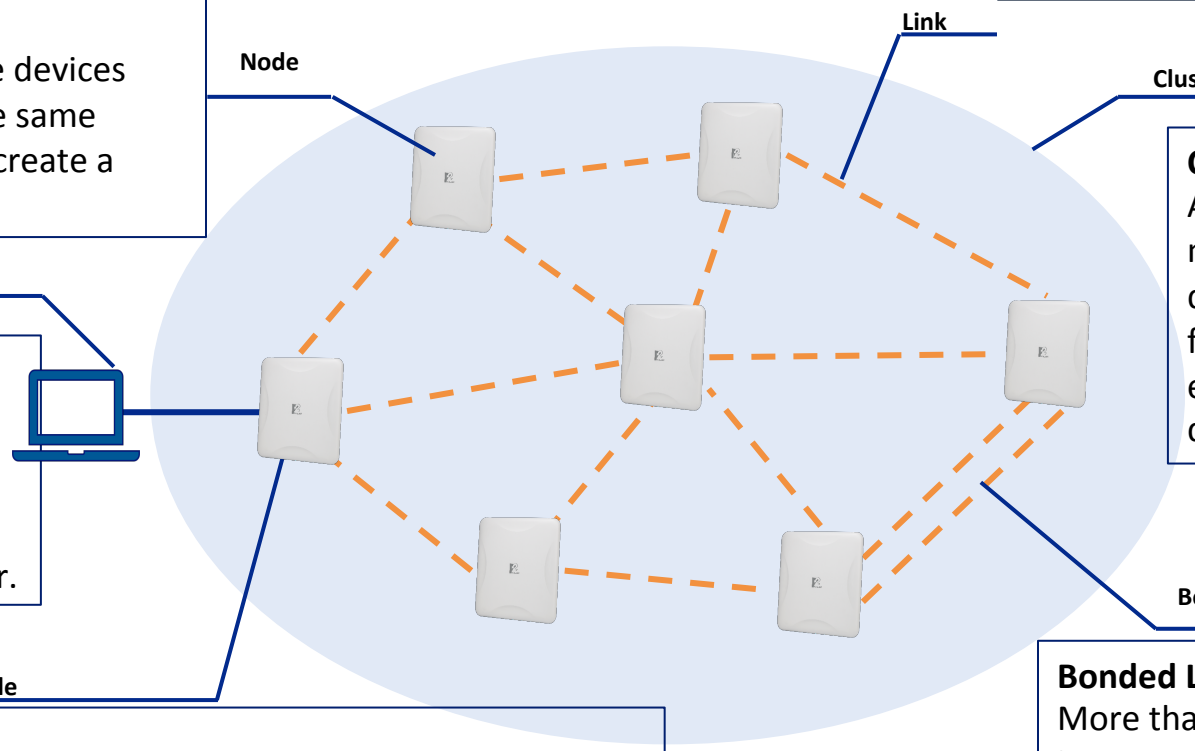
Intelligent Connectivity Anywhere Technology



MESH Definitions

Node
Anywhere Networks' device automatically discovers active devices within range. If they share the same Cluster ID, they form links to create a cluster.

Link
The wireless transmission between two nodes. Anywhere Networks' devices can protect the data over each link with AES 128 bit encryption.



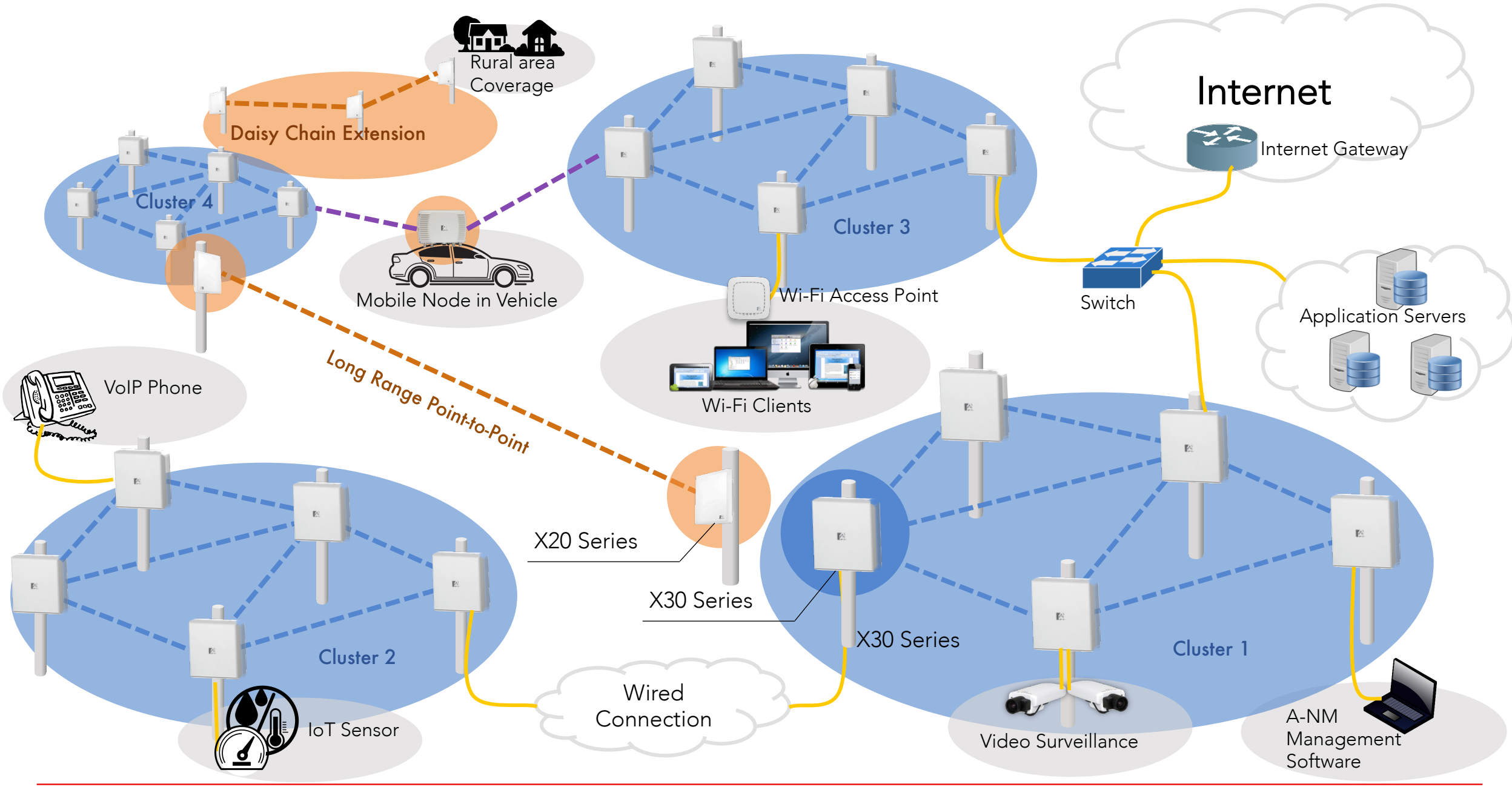
Anywhere Network Manager

Network Management Software for configuration, monitoring and management of Anywhere Networks Cluster.

Cluster
A collection of max. 64 connected nodes. A cluster maximizes the utilization of the network by determining the optimal path for each data traffic flow. A cluster provides a Layer 2 network environment just like an Ethernet switch that distributes its ports into different nodes / locations.

Host Node
The only node that communicates with the A-NM, responsible for data collection and management message delivery to the other nodes.

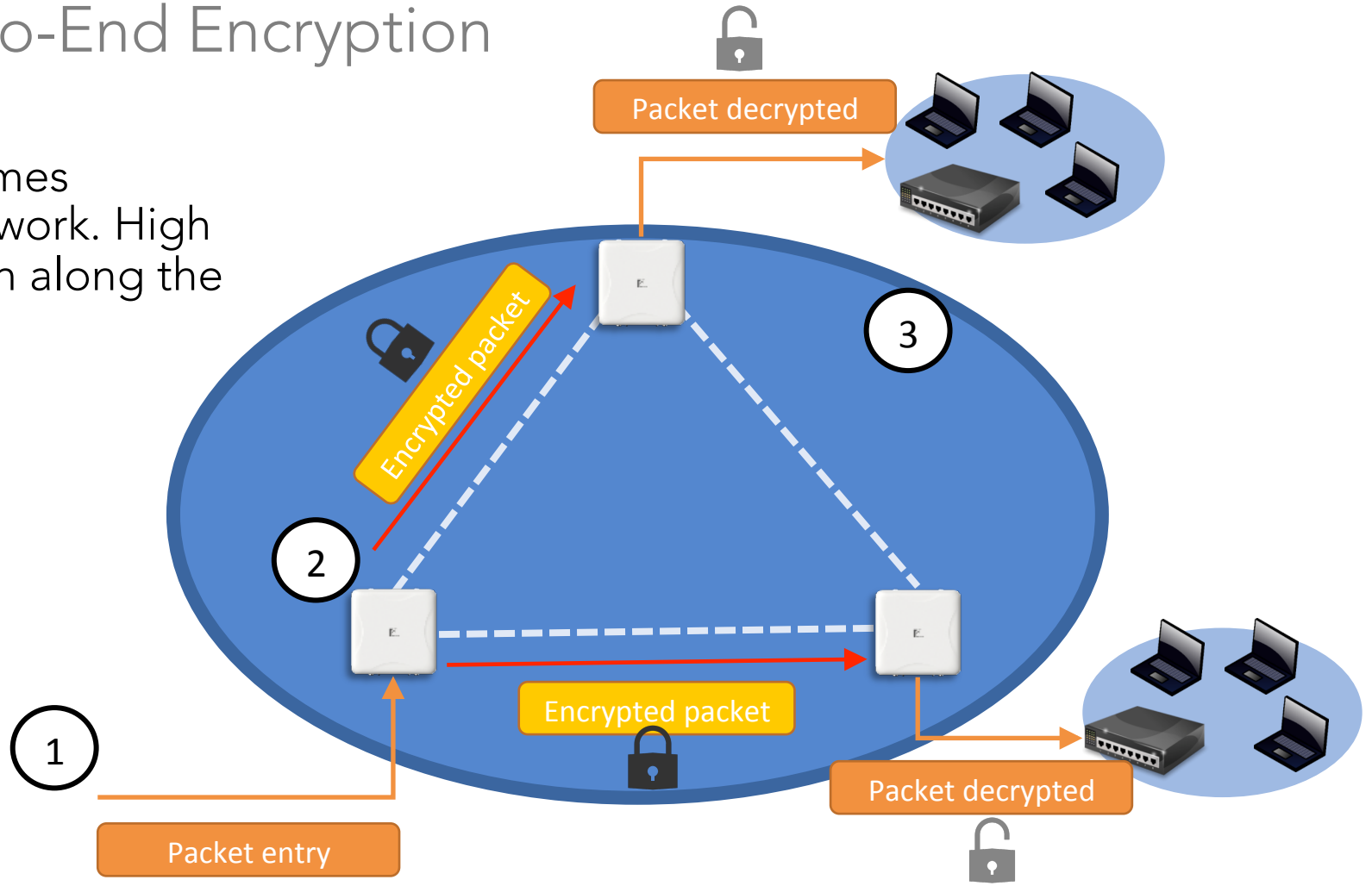
Bonded Link
More than one link can be formed between the same nodes by using all the radios. This effectively improve the throughput between these nodes.


Rural area Coverage
Daisy Chain Extension
Cluster 4
Mobile Node in Vehicle
Cluster 3
Internet
Internet Gateway
Switch
Application Servers
Wi-Fi Access Point
Wi-Fi Clients
VoIP Phone
Long Range Point-to-Point
X20 Series
X30 Series
X30 Series
Cluster 2
Cluster 1
Wired Connection
IoT Sensor
Video Surveillance
A-NM Management Software

Advanced Features

AES 256 bit End-to-End Encryption

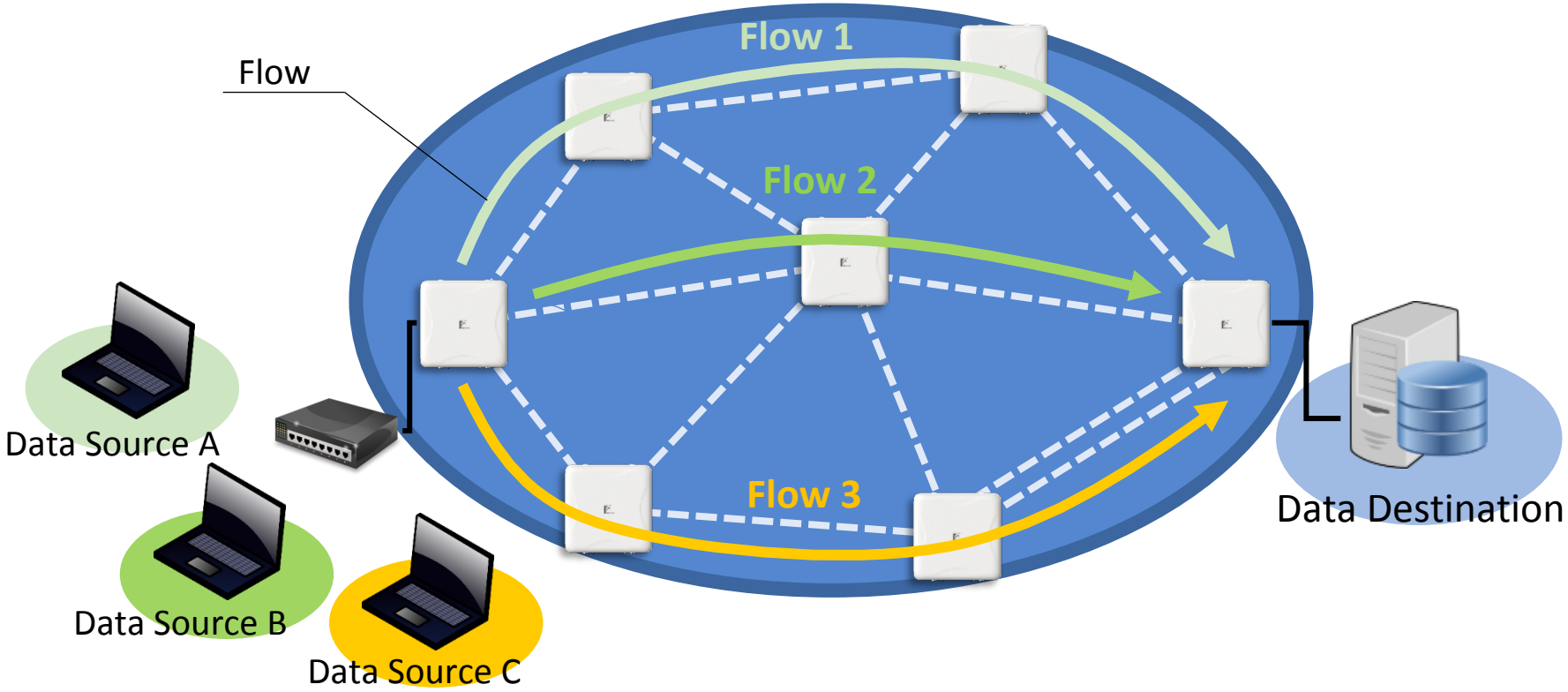
Data packets are at all times encrypted within the network. High security from interception along the way.



Flow based load balancing

Traffic Flow inside the Cluster

Select the best path based on the link capacity and load-balancing the traffic utilize the resources and improve overall throughput.



Anywhere Networks Product Setup

External antenna for radio 2 (5Ghz)

x20/x30 main unit with integrated antenna for radio 1 (5 Ghz)

Mounting kit

POE output for IP surveillance camera (x30 only)

RF cable

POE input (Injector not shown here)

Anywhere Network Nodes

x30 Series	x33	• 2x2:2 MIMO* • 3 radios (2x5GHz + 1x2.4/5GHz) • 1 int. + 2 ext. antenna	• Up to 1,000 Mbps throughput at 500 m • More than 20 hops • 66 HD IP cameras • 2x ethernet port (PoE)
	x32	• 2x2:2 MIMO* • 2 radios (2x5GHz) • 1 int. + 1 ext. antenna	
	x32e	• 2x2:2 MIMO* • 2 radios (2x5GHz) • 2 ext. antennas	
x20 Series	x20	• 2x2:2 MIMO • 2 radios (2x5GHz) • 1 int. + 1 ext. antenna	• Up to 600 Mbps throughput • More than 10 hops • 40 HD IP cameras • 1x ethernet port (PoE)
	x22e	• 2x2:2 MIMO • 2 radios (2x5GHz) • 2 x ext. antenna	

x30 Series

- 2 or 3-radio (2 x 5GHz + 1 x 2.4/5GHz)
- 2 x 2:2 MIMO Wave-2
- 5/10/20/40/80/160 MHz channel ^
- Max. data rate 1,733 Mbps per radio
- Built-in 5GHz 20 dBi antenna, 2 external 5GHz connectors, 2 external 2.4/5GHz connectors
- Backhaul up to 24km

- 2 × Ethernet ports
  - ETH 0 : PoE-in (60W)
  - ETH 1 : PoE-out (802.3af)
- Built-in heater
- Hardware RF filter
- IP67 weatherproof
- Support A-OS 1.x

^ Available in future release

* Lab tested in controlled environment based on PTOS 2.4 firmware

x20 Dual 5GHz

- Dual 5GHz radio
- 2×2:2 MIMO 20/40/80 MHz channel
- Max. data rate 867 Mbps per radio
- Built-in 5GHz 19dBi 17° panel antennas and 2 external 5GHz connectors
- Backhaul up to 24km
- 1 × Ethernet port, 802.3at PoE
- IP67 weatherproof
- Support PTOS 2.4 only

* Lab tested in controlled environment based on PTOS 2.4 firmware

x22e Dual 5GHz

- Dual 5GHz radio
- 2x2:2 MIMO, 20/40/80 MHz channel
- Max. data rate 867 Mbps per radio
- 2 x External 5GHz antenna connectors
- Backhaul up to 24km
- 1 × Ethernet port
  - 802.3at PoE
- Support DC 12V power
- Compact form-factor (221x162x47mm)
- IP67 weatherproof

- EN50155 & EN50121-3-2 Railway-related certificates
- Support PTOS 2.4 only

* Lab tested in controlled environment based on PTOS 2.4 firmware

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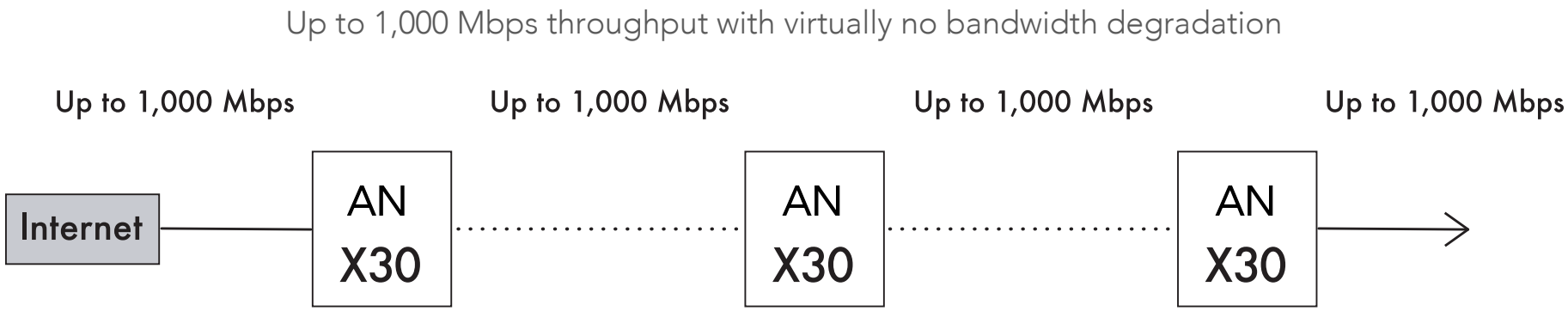
Intelligent Connectivity Anywhere Technology Advantages

Fiber Quality Anywhere Technology

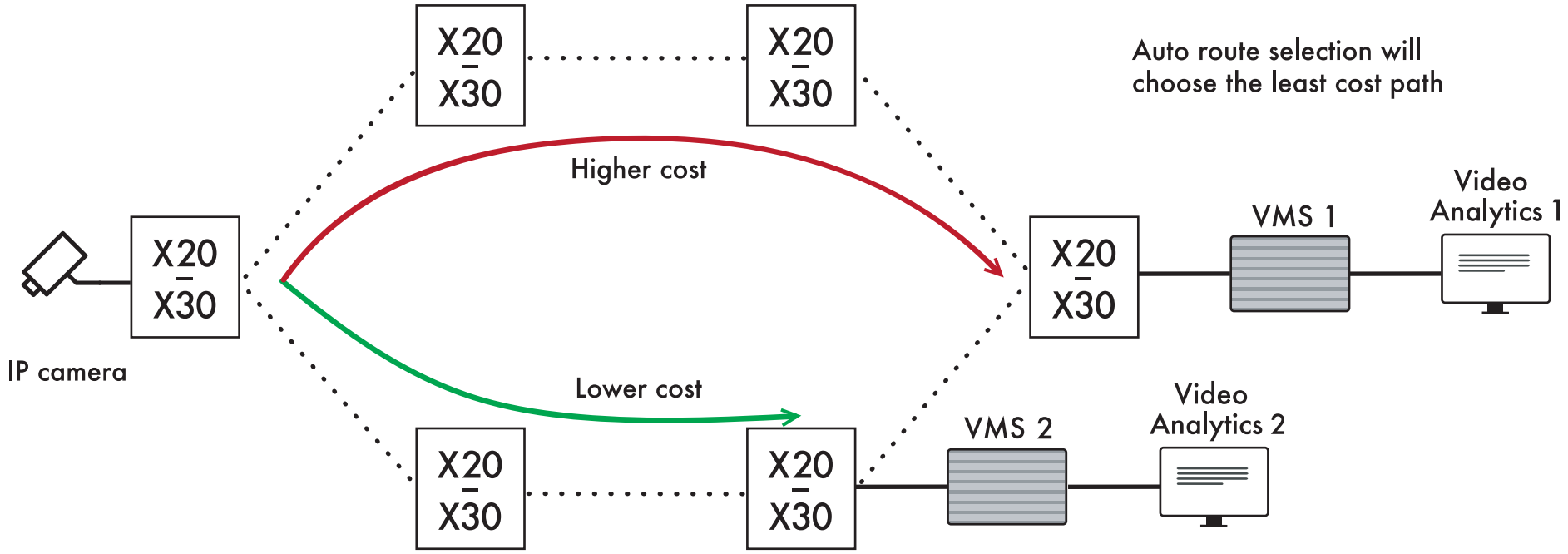
- Wireless network capable to expand to over 20 hops
- 6 times higher throughput than conventional PTP/PtMP (1,000 Mbps vs. 150 Mbps)
- No need for an external controller and no single-point-of-failure

- AN= Anywhere Node



Auto Path Selection

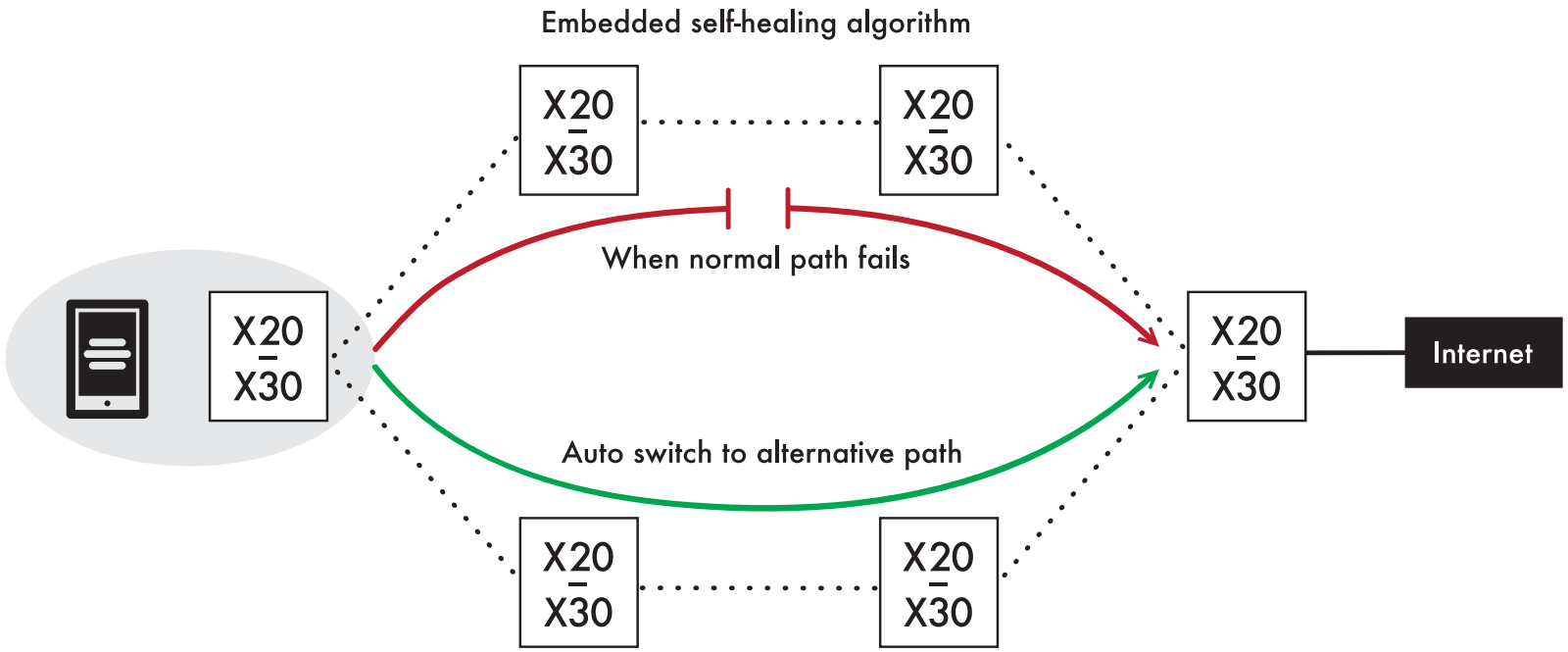
- Auto distribution of traffic amongst selected sites or servers based on least path cost
- Same or different gateway locations
- Customizable configurations



Auto Recovery

- Auto failover route selection
- Auto switch over in seconds
- Auto recovery when primary path is resumed normal

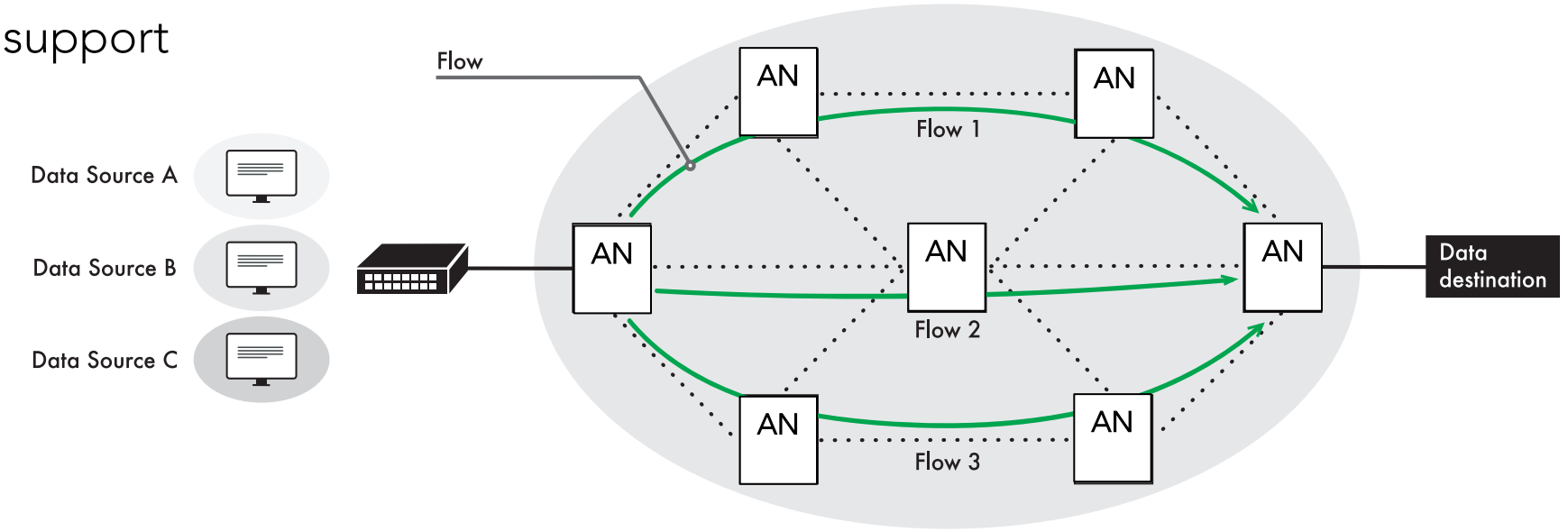
- Large cost saving compared to conventional 1+1 redundancy



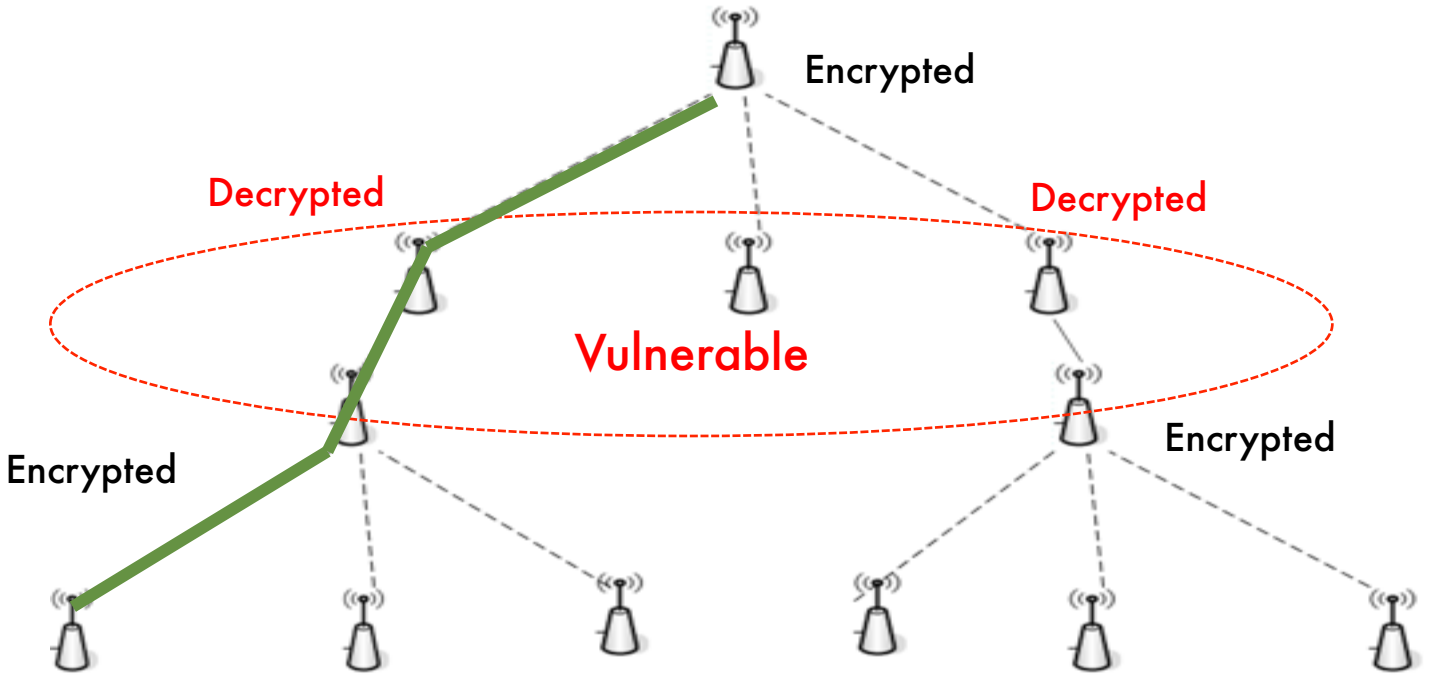
Advanced Features – Flow Routing

Traffic Flow inside aOS 1.0

- Automatically selects the best data path based on available link capacity to load-balance and the overall network traffic and improve overall throughput.
- Ethernet-switch like experience – over wireless!
- 1 IP address per cluster for easy management
- VLAN & Multicast support



Security: End-to-End Secure Transmission



Anywhere Networks Advantage

- **No security pitfalls** with per hop decryption and encryption
- **3 factor authentication + 2-tier key generation + AES link encryption, for PTOS only**
- **No degradation** in latency enables secure video/voice backhaul
- **Mesh ID** control
- **MAC-based** access control

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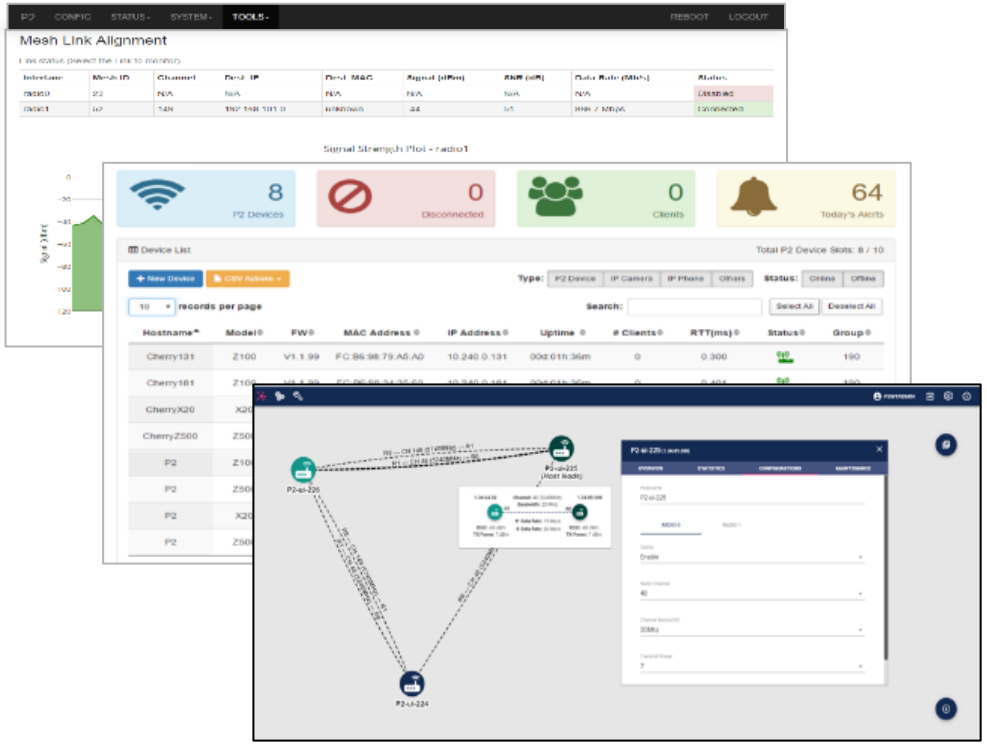
Configuration & Management Software

Anywhere Node Manager Suite

A comprehensive suite of software for hardware configuration, profiling, monitoring, and wireless network management



Anywhere Node Manager (A-NM)

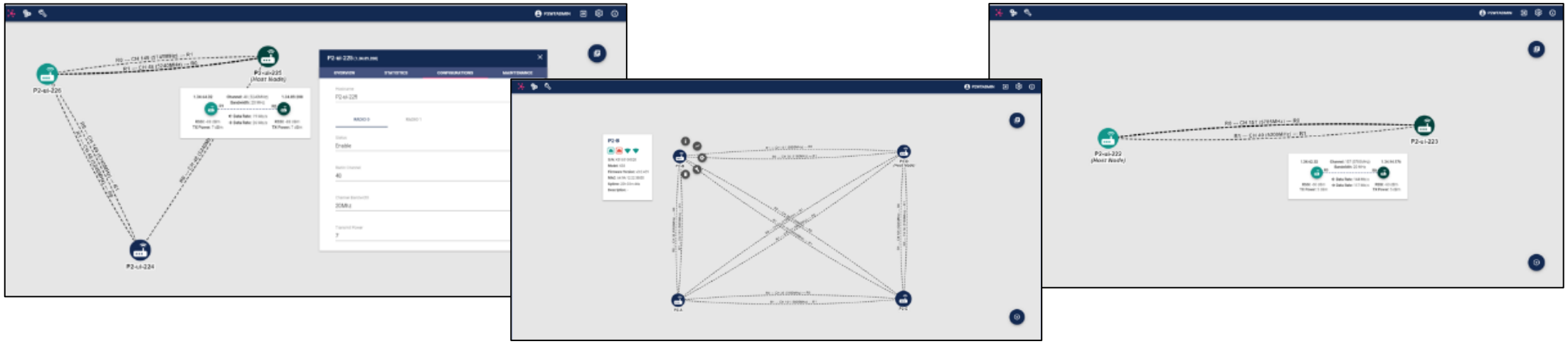
- A provisioning software and Link management software for X30 series hardware

SmartMoment

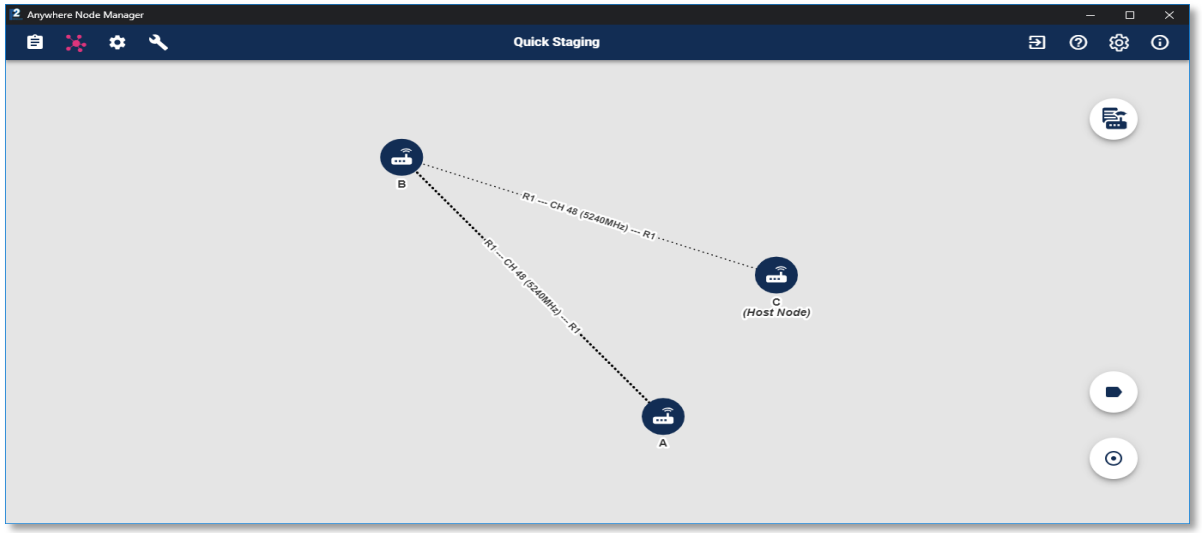
- A device configuration software for use on X20 series hardware

Anywhere Node Manager
(only for X30 with A-OS 1.0)

- Visualize the mesh topology on a single page with real-time status of nodes and mesh links status by hovering the mesh node and mesh link icons.
- Easy to use and setup, intuitive interface
- Node Information includes device information, device status, and performance statistics.
- Make changes either cluster-wide or node by node



Topology View



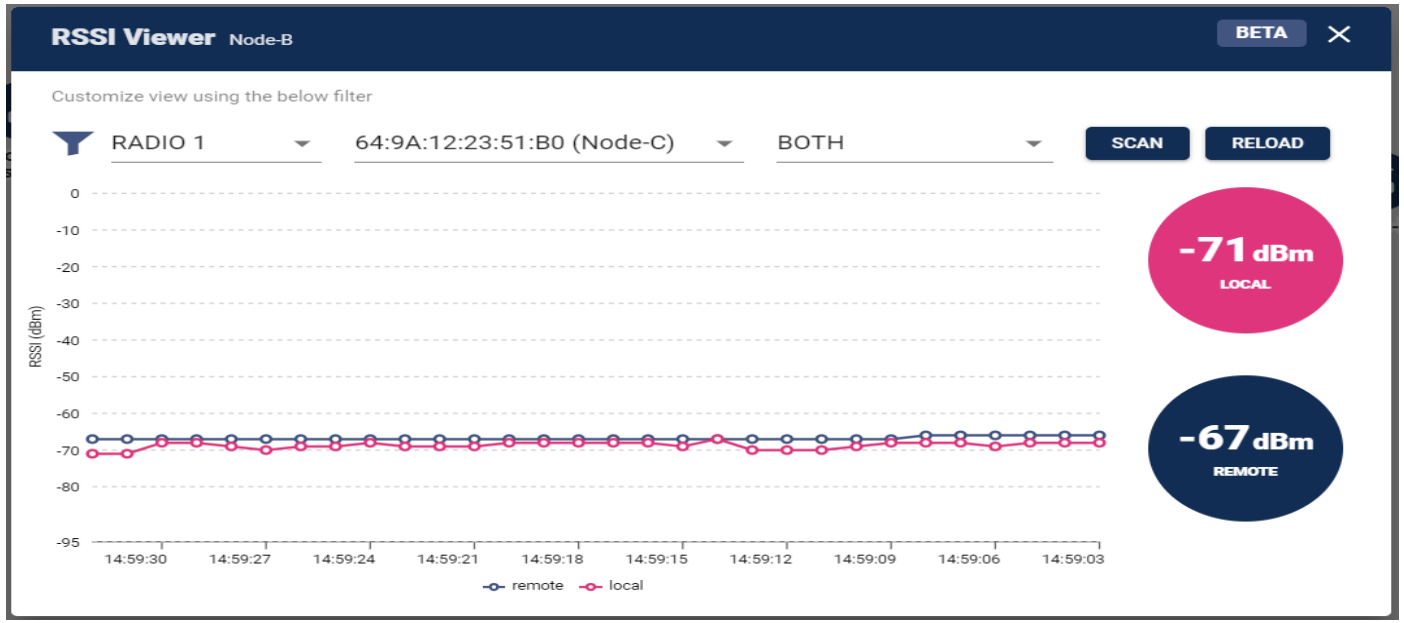
Icon	Status
	Unmanaged
	Reachable
	Unreachable
	Management Secret Mismatch

- Auto-discover all neighbors in the cluster, not just the Host Node that your PC are connecting to.

NOTE: Auto-forming will take place with the default configuration and it is needed to install an antenna for them to establish links

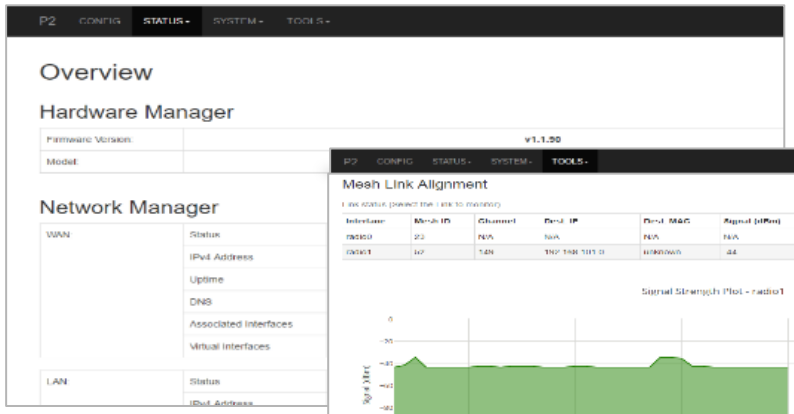
RSSI Viewer

- *RSSI Viewer* provides an interface to monitor the RSSI of a wireless link associated with the node.
- **Note**: You can only open one RSSI Viewer window at the same time.

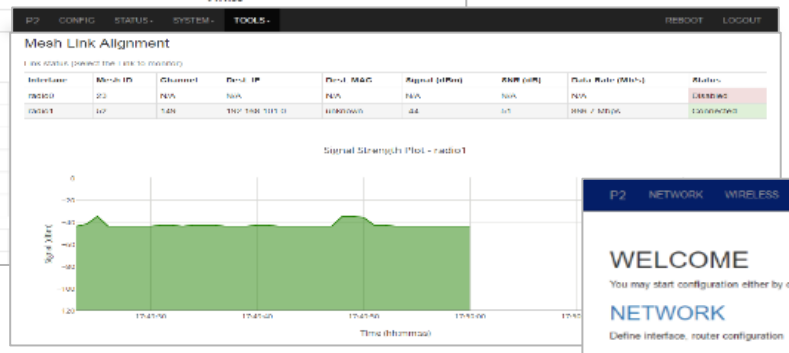


SmartMoment
(For X20 and X30 with PTOS 2.4)

- Built-in web interface to configure and manage X20 & X30 hardware
- Streamline basic configuration for mesh network, router, and AP applications



Home Page



Mesh Link Alignment Tools

Config Page

** Use CLI for troubleshooting*

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Sample Applications & Success Stories

Sample Applications

Safe City

- Public security
- Traffic monitoring
- Crime prevention
- Municipality control
- Crowd control etc.

Critical Infrastructure

- Railways
- Mass transit railways
- Terminus
- Piers
- Bridge etc.

Safe Campus

- Real estates
- Container ports
- Universities
- Theme parks
- Plants and warehouses
- Extraction fields etc.

Safe Event

- Exhibitions and events
- Bazaars
- Construction sites etc.

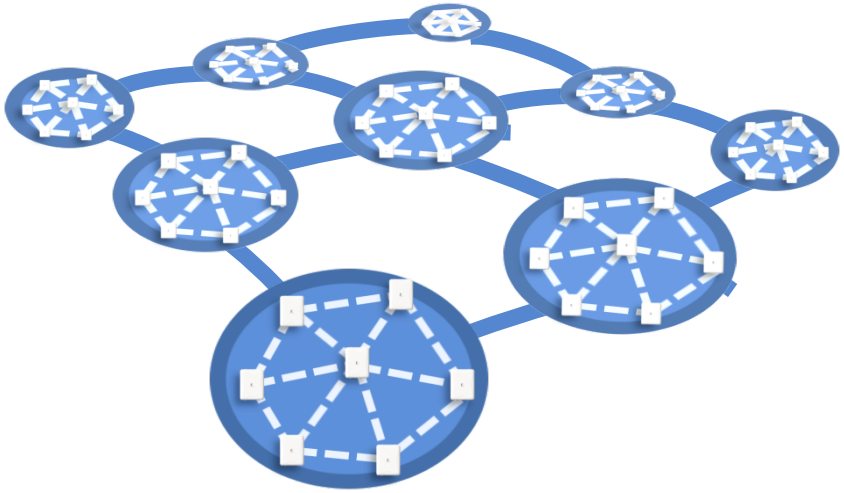
Emergency Response

- Patrol vehicles
- Police
- Disaster victim identification etc.

Anywhere Networks
Intelligent Network Scalability

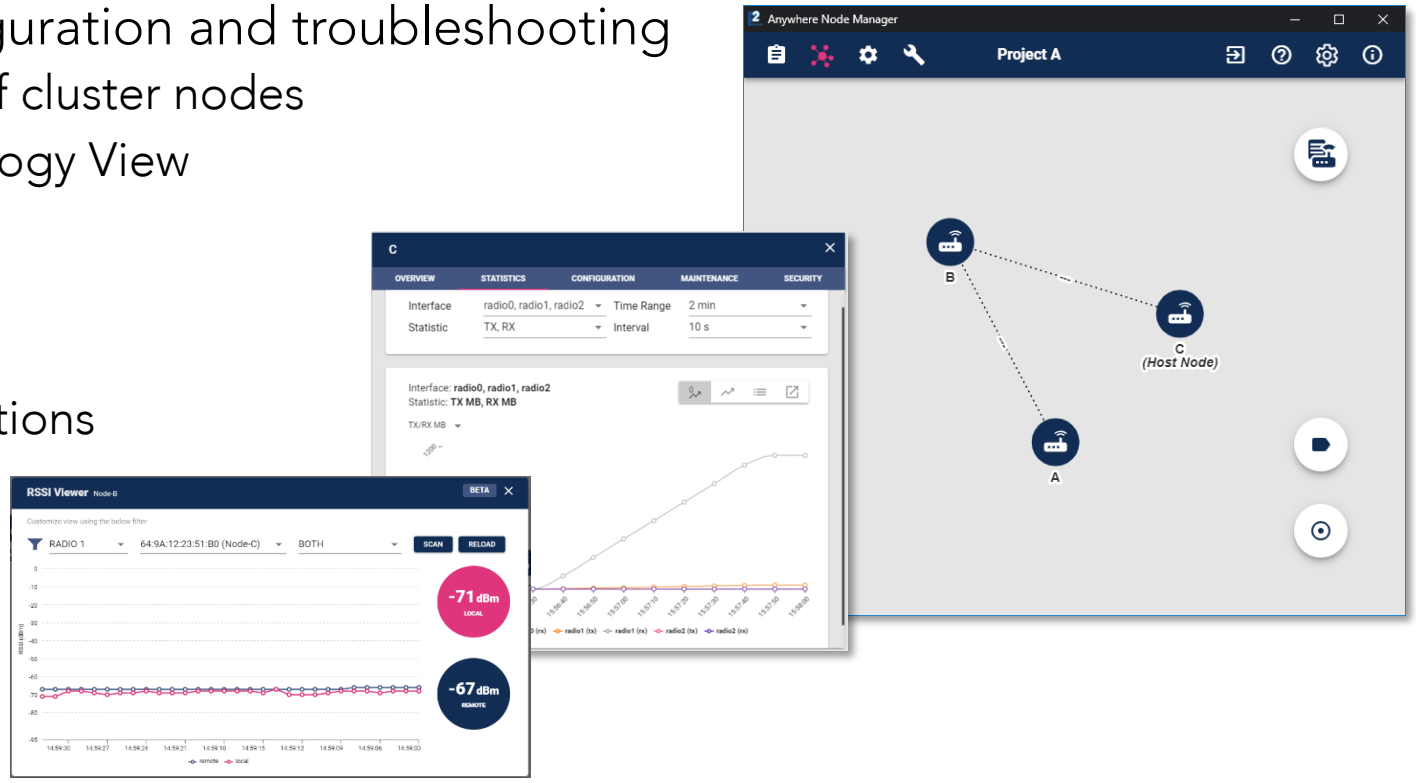
- Ethernet connectivity
- Flow based routing
  - Intelligent dynamic path selection
  - Multi-path transmission
  - Load balance
  - Class of Service
  - Environment aware optimization
  - Highest level network security
  - Low latency
  - Little network jitter
- BUM traffic management
  - Intelligent broadcast traffic management
- Anywhere Node Manager, A-NM
  - Intuitive GUI for network management
  - Manage the network simply with a single management IP address

Interconnect clusters to build and manage one SmartCity network. Up to 300 clusters per network, one IP address



Anywhere Node Manager

- For staging, configuration and troubleshooting
  - Auto discover of cluster nodes
  - Graphical Topology View
  - Intuitive Design
  - Statistic
  - RSSI Viewer
  - Cluster-wide Actions



Product Applications

X30 Series  With A-OS	• SmartCity/SafeCity-wide network implementations • Where mission critical network features are required • Core Backhaul deployments leveraging fiber infrastructure
X20 Series  With PTOS	• Point-to-point, daisy chain, and ring topologies • High performance wireless link • Connecting a small number of IoT devices

Summary

- Proven product market fit
  - Installations in 15 countries
- Product roadmap well defined
  - Technology is in place
- Go-to-market strategy verified and in place
  - Solution partnerships in place
  - Channel partners in 15 countries in place
- US and China regional offices are in place
  - Silicon Valley and Guangzhou

Australia: SmartCity wireless infrastructure upgrade for a SafeCity surveillance system

Application:

- Maribyrnong City Council in the metropolitan Melbourne area has been looking for a solution to upgrade their aging wireless networks that connects their surveillance cameras.

The Challenge

- More advanced camera required high capacity & low latency network.
- The common wireless technology that utilizes point-to-point and point-to-multipoint technology can't meet the all the requirements

The Solution

- Two mesh rings of 25 wireless nodes covering the whole area, supporting 80 high-definition cameras
- Scalable system that can be easily expanded in the future
- Wireless link redundancy and auto-recovery features are incorporated for highly resilient network structure

Hong Kong: MTR, Tsing Lai Bridge

Application: Critical Infrastructure wireless video surveillance preventing vessel accidents and to monitor bearings along Tsing Lai Bridge in Hong Kong, a major bridge that connects the airport and the mainland.

Challenge:

- High throughput supporting 25 IP cameras or 800 Mbps data rate
- High interference in the area
- Hardware redundancy and fast auto-recovery

Solution:

- Anywhere Networks' (formerly P2 Wireless) wireless mesh solution with 2 x 4-hop rings
- Each site contains 2 units of X20 connected by a data switch for hardware redundancy
- 16 units of X20 are used for the project
- IP cameras are connected to the data switches

Result:

- Impressive throughput and stable performance
- X20 operate smoothly at 20/40 MHz channel supporting 400/800 Mbps data rates
- Very low latency of <10 ms and no packet loss
- Fast failover recovery time

Philippines: Smart City Project for Emerging Markets

Application: Smart City wireless mesh for video surveillance, access control, flood monitoring, environmental protection, paging system, and traffic lights control in Cabanatuan City in the Philippines.

Challenge:

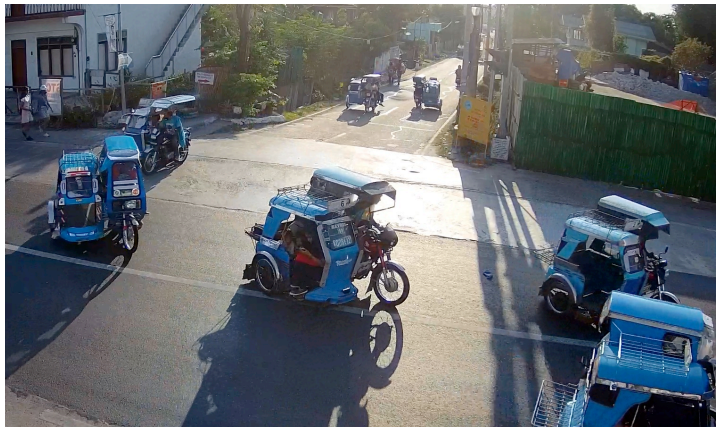
- High level of interference at platform area
- Difficult to expand existing surveillance network by laying cable

Solution:

- Anywhere Networks' (formerly P2 Wireless) wireless mesh solution connecting 300 surveillance cameras, 8 flood monitoring equipment, 20 traffic lights, and 20 paging system.

Result:

- Replaced entire legacy analog surveillance network
- Robust and resilient network for the critical infrastructure
- No cabling required



Saudi Arabia: Wireless Surveillance Infrastructure

Application: Smart Virtual Fiber and Surveillance Solution for Critical Infrastructure in Mecca, Kingdom Of Saudi Arabia

Product: X20 Anywhere Network Node

Challenge:

- High throughput requirements – up to 28 outdoor locations with more than two IP cameras at each location. Up to 800 Mbps of throughput required
- High interference environment with more than one microwave system in place
- The entire system requires full hardware redundancy with fast auto-recovery time for critical infrastructure– less than 10 seconds

Solution:

- Four rings wireless meshes with multiple hops each ring with two single radio offload points for each ring at the data center for full hardware redundancy and no Single Point of failure
- Each location is installed with various IP cameras like PTZ and Fixed cameras from different vendors.
- All Cameras and Mesh Rangers are powered using Solar Energy.

Result:

- X20 delivers an impressive throughput and stability performance, despite the challenging environment. The rings support 400 Mbps at 20 MHz channel bandwidth. 800 Mbps data rate is attained when using 40 MHz channel. Negligible latency and packet loss. Fast failover recovery time below 10 seconds.

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Thank You

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